OFFICE OF
RIVER PROTECTION
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Waste Treatment and Immobilization Plant High-Level Waste Facility Status and Path Forward

Hanford Advisory Board – Tank Waste Committee

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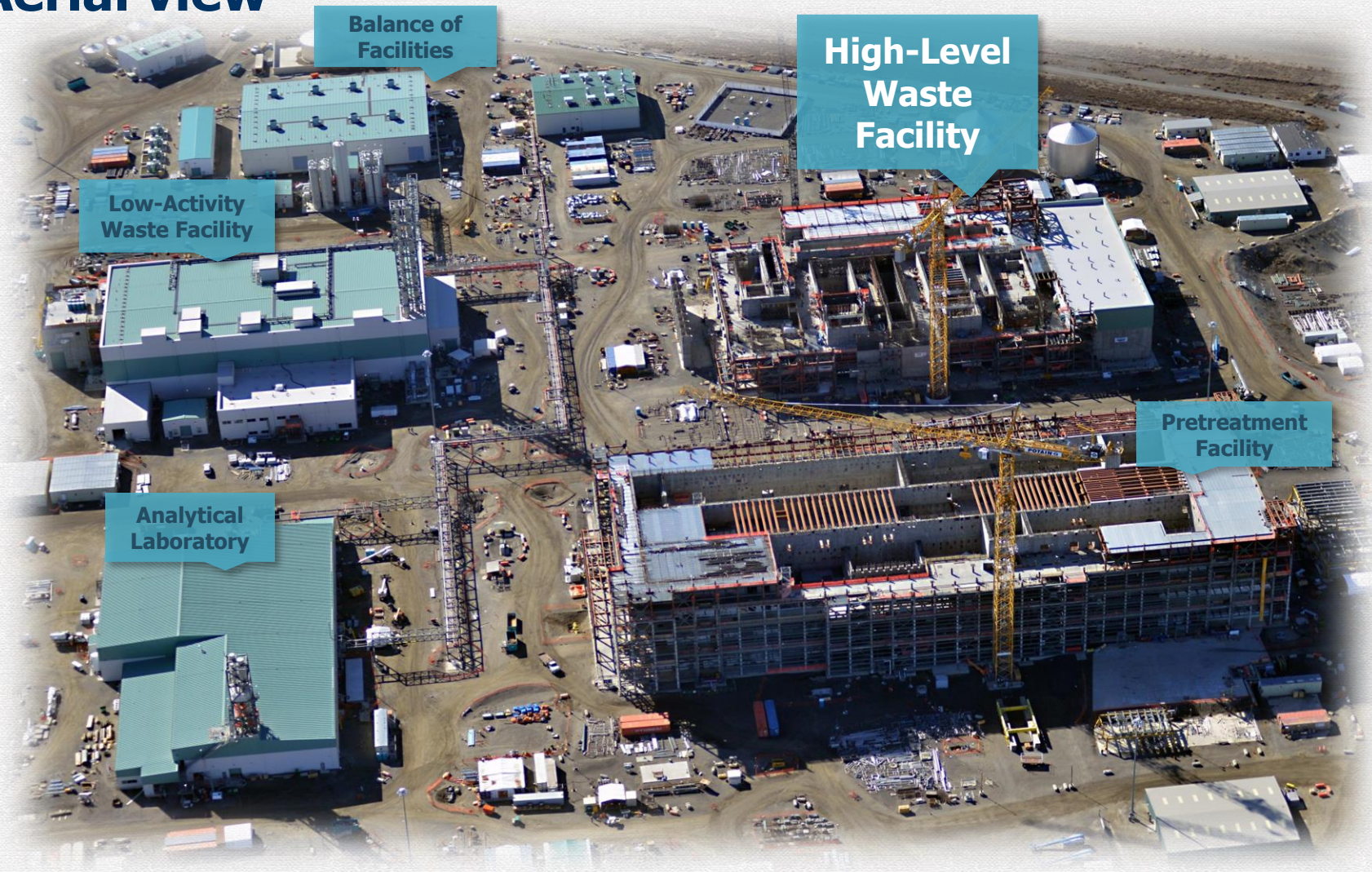
Aerial view


Balance of Facilities
High-Level Waste Facility
Low-Activity Waste Facility
Pretreatment Facility
Analytical Laboratory

High-Level Waste Facility Basics

- High-Level Waste (HLW) Facility receives HLW slurry from Pretreatment Facility
- Vitrifies the waste in two melters to produce a stable glass form (immobilized HLW)
- Vitrified glass is stored in sealed containers for future shipment to an offsite repository

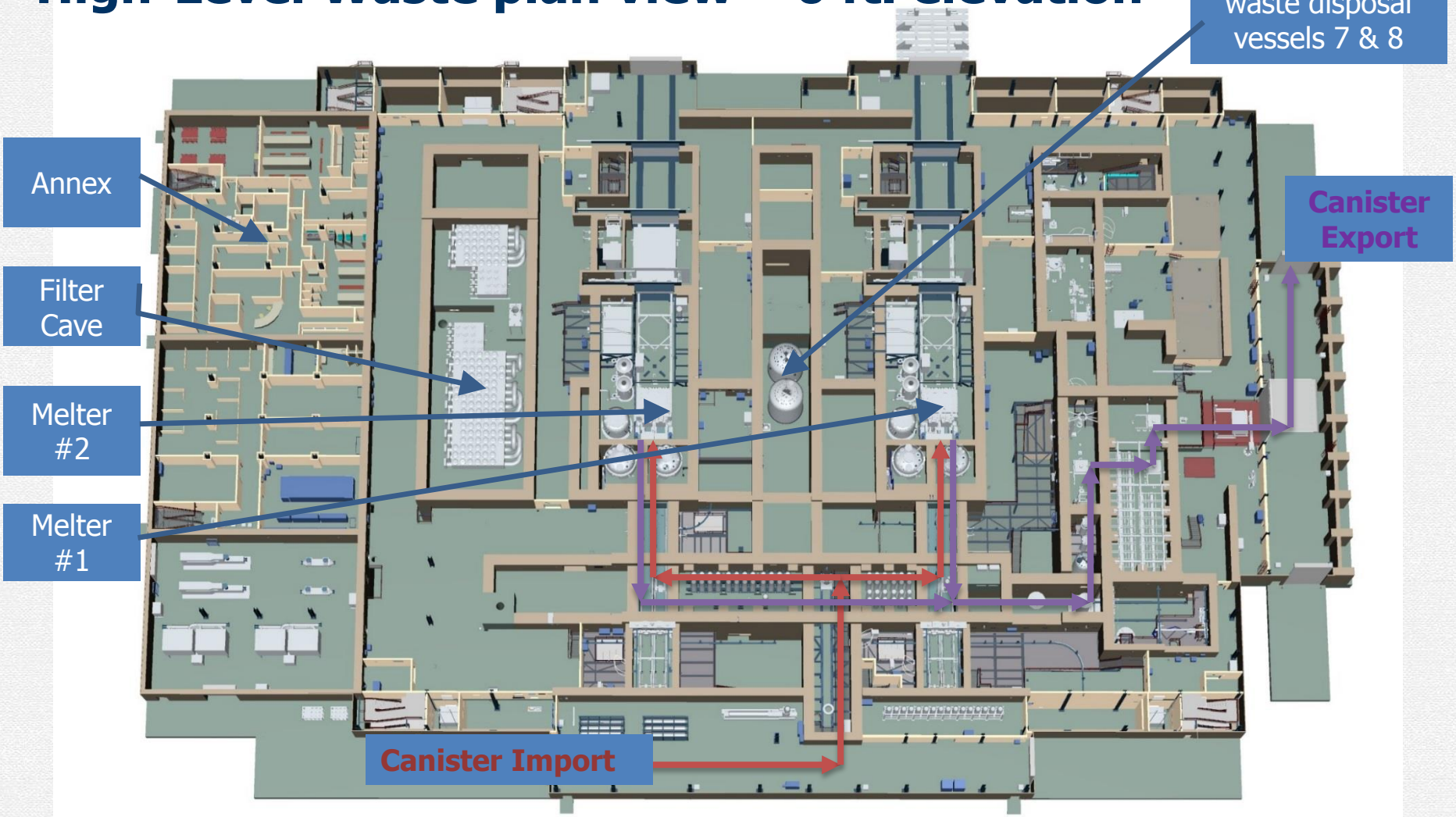
High-Level Waste Facility Basics (continued)

- Key processes:
  - Receive waste, blend with glass formers, and transfer
  - Sample for process control and glass qualification
  - Vitrify feed to glass in melters
  - Canister handling and decontamination
  - Melter offgas treatment
  - Ventilation system

Melter bay

- Key physical parameters:
  - Produces 6 metric tons (MT) glass/day; 3 MT per canister
  - HLW Facility is 440 ft. long by 275 ft. wide by 95 ft. tall
  - Contains two 90 ton melters, 14 ft. long by 14 ft. wide by 11 ft. high

High-Level Waste plan view – 0 ft. elevation



Background

- Engineering, construction, and procurement activities were limited since 2012
- U.S. Department of Energy (DOE) authorized production engineering for the HLW Facility in August 2014 based on:
  - Implementation of the Systems Engineering Management Plan
  - Implementation of improved engineering and nuclear safety processes
  - Development of safety design strategy (SDS)
  - Completion of risk assessments for open technical issues
  - Completion of risk assessment for continuing limited construction
- Procurement and construction are still limited and approved on a case-by-case basis

Background

Technical issues

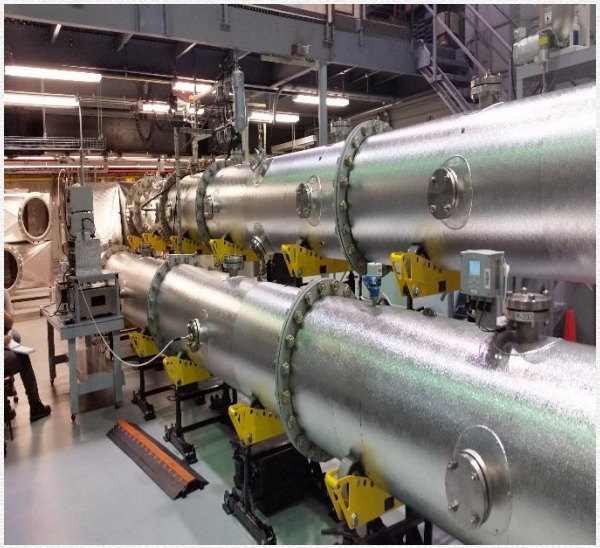
- Pulse-jet mixer (PJM) performance
- Erosion-corrosion validation
- Vessel structural integrity
- High-efficiency particulate air (HEPA) filter adequacy
- Design and Operability (D&O) review vulnerabilities

Ongoing activities

- Full-scale testing completed for validation of PJM controls system
- Testing for verification of erosion-corrosion
- Completed re-design and awarded procurement of the updated radioactive liquid waste disposal vessels 7 & 8
- Testing of re-designed HEPA filters at Mississippi State University to meet operating conditions
- Engineering studies to mitigate vulnerabilities from DOE D&O review on ventilation system, off-gas system, and waste handling system
- Development of updated Preliminary Documented Safety Analysis (PDSA) for alignment of design and nuclear safety
- Limited civil construction

High-efficiency particulate air filter testing

- Existing HEPA filter design
  - Tested to accommodate Waste Treatment and Immobilization Plant bounding conditions
  - Testing showed design could not meet the bounding conditions
- New strategy developed
  - Separate out operating conditions for off-gas system and ventilation systems
  - Develop multiple HEPA filter designs to suit various systems
  - Perform full-scale testing of multiple filter designs for specific system conditions
  - Select HEPA filters to suit each system
- Current status
  - Full-scale filter testing initiated for the first design
  - Remaining filter designs are being fabricated for testing



Path forward

DOE finalizing the criteria for authorization of full production

- Implement systems engineering and updated Bechtel National, Inc. processes for design reviews and procurement
- Approve PDSA update to align design with safety basis
- Complete HLW Facility engineering studies to resolve D&O issues, SDS gaps, etc.
- Develop a HLW Facility completion plan providing strategy for facility rebaselining incorporating all engineering, procurement, construction, and commissioning activities

Summary

- HLW Facility construction limited since 2012
- Authorized for production engineering in 2014
- Implementation of process improvements, technical and design issue resolution, nuclear safety basis alignment ongoing
- Developing criteria for authorization of full production
- Planning for future project re-baseline

Questions?

Back-up Slides

Alignment of design and nuclear safety basis

The following is the three-step approach for updating the PDSA that aligns facility design and nuclear safety basis:

1. SDS (approved by DOE in August 2014)
   - SDS is not a safety basis document
   - Provides safety analysis approach, philosophies, and assumptions for design and nuclear safety issues
   - Establishes a preferred set of controls in agreement between engineering, operations, and nuclear safety
   - Guides future hazard analyses and design activities

Alignment of design and nuclear safety basis (cont.)

2. SDS-PDSA gap analysis (completed in November 2014)
   - Evaluates the SDS preferred controls against existing PDSA controls to identify differences in functional classifications, safety functions, functional requirements, performance criteria, etc.
   - Defines the scope for future hazards analyses, supporting calculations, engineering studies, or design products needed to incorporate control strategy

3. PDSA update (planned completion in 2016)
   - Perform full facility hazards analysis using the preferred controls and design changes identified in the SDS and the PDSA gap analysis